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Science and Technology

No. 51

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NATURAL SCIENCES

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DAM PROJECT SAID TO ENDANGER FISH POPULATIONS

Beijing GUANGMING RIBAO in Chinese 27 Jun 80 p 2

[Article by Lu Xi [7627 3679]: "Don't Forget About Saving Fish When Building the Hezhou Dam Installation!"]

[Text] In the more than 30 years since the state was founded, this country has built many water conservancy projects without providing fish passes, with the result that fish could not return to spawn and fatten, and accordingly many varieties have become exhausted or died out, which has gravely damaged fresh-water fish production. For example, when Hubei Province built several hundred large and small dams, none had provision for passage by fish, so that the aquatic resources moved daily closer to exhaustion. Currently the provincewide catch of aquatic products is only 22 or 23 percent of that in the 1950's. The Hezhou Dam, recently put in across the Yangtze River, will cut off the flow, and it is said that fish passes have still not been provided, so that the ultimate results will be extremely grave.

The Yangtze River produces large amounts of various kinds of freshwater fish. More than 260 different types have already been studied, of which 40 are economically important. Of these, the black carp, grass carp, silver carp and variegated carp, and the eels and tongyu [6894 7625], together with the sturgeon, marlin, wei [7625 0604] and jia [3946] (Chinese sturgeon), which are called the four famous products of the Yangtze, are all very valuable aquatic products. The Chinese sturgeon is an ancient fish which is a relic of the Jurassic period, 140 million years ago, and has been called a "living fossil." Bionically speaking, the fact that the Chinese sturgeon can swim upstream for thousands of kilometers without losing its way conceals many zoological secrets which are worth probing. If the Hezhou dam closes off the flow without leaving fish passes, these resources will decline greatly, and the Chinese sturgeon and white sturgeon which our country is making a great effort to protect will be in danger of extinction.

Currently the comrades who oppose including a fish pass in the Hezhou Dam have three arguments: 1) after the dam is built the species in question will find new spawning grounds; 2) they can be preserved by being

raised artificially, thus developing resources of the Chinese sturgeon and the like; 3) building fish structures would cost 20 or 30 million yuan, which is not economically justifiable. I believe that the spawning grounds of the economically important Yangtze fish were all developed in the extensive river over a long historical period, and if this environment is suddenly destroyed, they will have to find a new spawning area instinctively. But in the water, with its many interrelated factors, it is quite unclear whether or not it will be possible to find any relatively suitable spawning grounds, and how many kinds of fish will be able to find such spawning grounds. As to preserving them by raising them artificially, this cannot be assured. Artificial fish raising is aimed at making up for insufficient natural resources, but we cannot make up for losses caused by purposeful destruction of natural resources. For many years we have made intensive efforts in the Yangtze River valley to develop artificial fish raising, but we are still unable to make up for the losses resulting from past resource destruction. Currently, experiments in breeding the Chinese sturgeon have not yet been successful--so how can we speak of using artificial raising to preserve and develop this valuable variety? As for economic calculations, we advocate taking the broad view. If at a cost of 10 or 20 million yuan we can preserve two valuable varieties of fish which are unique in the world, surely this is worth it.

Some other comrades adduce technical difficulties to oppose building fish passages, but this argument does not stand up. Since the state was founded we have built several dozen fish passes; we have rich experience and have learned a great deal. The water conservancy departments and aquatic products departments all have specialized personnel who are capable of handling this type of design assignment. Currently the key problem is whether the relevant leadership will take this work seriously. They must immediately restore, replenish and strengthen the now-paralyzed "Joint Fish Pass Research Group," rapidly make fish-saving work (including fish passes, artificial breeding of valuable fish varieties and other measures) an important research task, and produce a good fish pass plan in a short time. The flow of the Yangtze River will soon be cut off, so that this work cannot be put off any longer.

8480
CSO: 4008

RESEARCH ON XECL LASER YIELDS ENCOURAGING RESULTS

[Article by Chen Jianwen [7115 1696 2429], Fu Shufen [0265 3219 5358], Liu Miaohong [0491 1181 1347] of the Shanghai Institute of Optics and Fine Mechanics: "High Pressure UV-Preionized Transverse Discharge Pumping XeCl Laser"]

[Text] At present, there is a wave of enthusiasm for XeCl laser research in the realm of rare-gas halide quasi-molecular laser.[1-6] Because XeCl has all the characteristics of the quasi-particles, such as a radiation wavelength within the UV region and high energy conversion rate, it is tunable, has a high repetition rate, has a long working life and can use a wide variety of chloride, this kind of laser has great practical value.

It has been drawing the attention of more and more researchers. Burnham et al[7] and Sze et al[8] adopted HCl as the Cl donor and, with a total gas pressure higher than 3 atmospheres, the energy conversion rate has reached 1 percent. In the Northrop Research and Technology Center, a 180-millijoule output has been obtained in a 1-liter spark preionized set-up. These results are comparable to those obtained from KrF laser.

We have used BCl_3,[9] CCl_4 and $CHCl_3$ as the chlorine donor and by means of corona ionization under 1 atmosphere, we have successfully achieved coherent XeCl laser radiation.

This article reports the experimental results of the high pressure UV-preionized transverse discharge pumping XeCl laser. The experimental set-up and the equivalent circuit are shown respectively in Figures 1 and 2.

A pair of yellow brass electrodes, 70 cm long, with an inside diameter of 2 cm, is installed inside a cylindrical gas chamber with an inside diameter of 87 mm. The optical cavity resonators are installed directly at the two ends of the cylinder, one end being a totally reflecting aluminum mirror with R = 3 m, while the other end is a quartz plate.
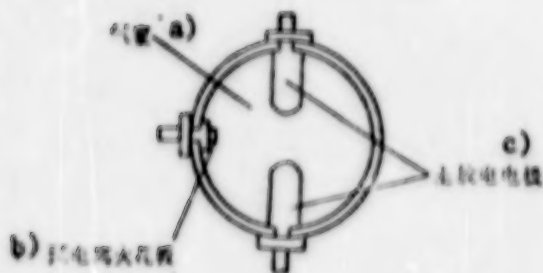
Figure 1. Simple diagram of experimental set-up

Key: a. gas chamber
b. preionization spark plate
c. principle discharge electrode
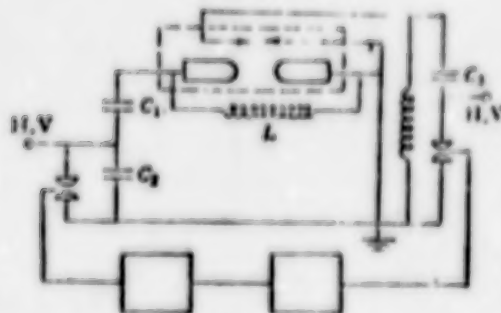
Figure 2. XeCl laser equivalent circuit

The primary discharging circuit is composed of parallel plate capacitors $C_1 = 16 \times 10^{-9}$ farad, $C_2 = 8 \times 10^{-9}$ farad and small inductance L. The preionized set-up consists of 28 spark gaps, and the power supply comes from a commercial porcelain capacitor C_3, $C_3 = 10 \times 10^{-9}$ farad. Main discharge and preionization are controlled by a time-delay activator; the time-delay region is tunable and lies between 0-1 microsecond.

When gas components in the ratio HCl:Xe:He = 0.2%:5%:94.8% are mixed to form 2 atmospheres, by employing a main discharge potential of 20 kilovolts and a preionization discharge potential of 18 kilovolts, the maximum energy output achieved is 43 millijoules, the bulk energy density becomes 3 joule/liter, and the total efficiency reaches a value of 1.4 percent. Without using preionization, the discharge chamber is filled with arc light and oscillations die out.

It must be pointed out here that, by using CCl_4 as the Cl donor, the results of UV-preionization are not as good. This may be due to absorption

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of UV-preionized photons by multiatomic molecules. Therefore, the output is obviously lower than that of the coherent radiation when HCℓ is used as the Cℓ donor.

Figure 3 is an XeCℓ laser spectrum recorded from a 31 WII 2-meter grating spectrograph. Whether the medium is a CCℓ₄:Xe:He system, or an HCℓ:Xe:He one, the radiation spectral lines are unrelated to the source of the Cℓ donor. From experimental results, the number of radiation spectral lines depends on the total gas pressure.

When the total gas pressure is 500 torr, 6 vibrational bands are simultaneously excited to radiate and the spectral lines are about 100 in number; when the pressure is 2 atmospheres, we have only 3 radiation spectral lines. Obviously, this is because with an increase in gas pressure, the frequency of molecular collisions increases, therefore particles in the high vibrational bands in an excited state relax to a lower vibrational energy level, and the density of the reverse particles in corresponding high vibrational state cannot satisfy the threshold condition. Thus the number of radiation spectral lines decrease significantly.

Also, we have observed the working life of the XeCℓ laser. Regardless of whether HCℓ or CCℓ₄ is used as the Cℓ donor, once it is gas filled, and after 5,000 stimulated radiations, the output level decreases to one-half of the initial output level. But with the same set-up, once the XeF, KrF, and KrCℓ lasers are stimulated to emit several hundred times, the radiation stops. This is unique to the XeCℓ laser. This may be due to the existence of $Cℓ_2$ and H_2 inside the discharge chamber. We have the following reactions:

$$Cℓ_2 + h\nu(308nm) \rightarrow Cℓ + Cℓ$$
$$H_2 + Cℓ \rightarrow HCℓ^* + H$$
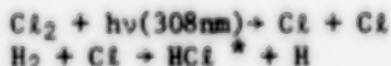
Although the amount of HCℓ decreases after discharge, the photodissociation cross-section of the 308 nm XeCℓ radiation remains quite large for $Cℓ_2$, and $Cℓ_2$ are ionized to be $Cℓ + Cℓ$ to guarantee a certain concentration of HCℓ in the discharge chamber, thus prolonging the life of stimulated radiation.

In the above assembly, we used HCℓ:Kr:He, NF_3:Ar:He mixed gaseous systems, and respectively obtained the laser output of 2221 Å for KrCℓ and 1933 Å for ArF. When air of 3 torr pressure and He gas of 2 atmospheres are used, the N_2^+ laser output of 4278 Å is achieved. The characteristics of those lasers will be published later.

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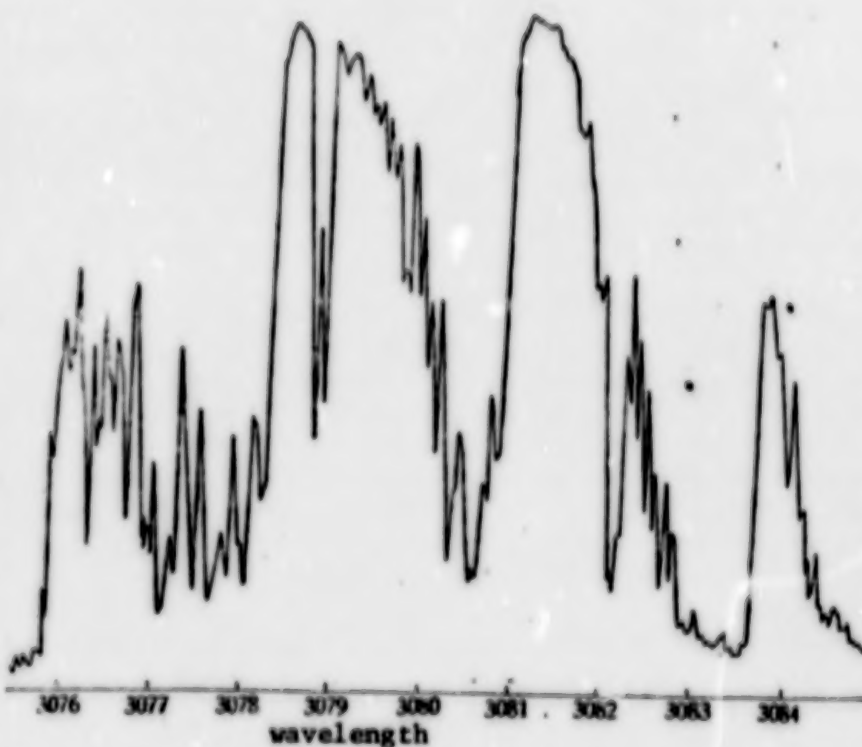
Figure 3(a) The XeCl laser spectrum when the total gas pressure is 500 torr

Figure 3(b): The XeCl laser spectrum when the total gas pressure is 2 atm.

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7. R. Burnham et al, OPT. COMMUN., 24 (1978), 161.

8. R. C. Sze et al, A.P.L., 33 (1978), 419.

9. Fu Shufen, Chen Jianwen et al; WULI (PHYSICS), 7 (1978), 348.

CSO: 4008

APPLIED SCIENCES

DEVELOPMENT OF CHINESE OPTICAL SCIENCE, TECHNOLOGY DESCRIBED

Hong Kong JINGJI DAOBAO [ECONOMIC REPORTER] in Chinese No 24, 18 Jun 80
p 28

[Article by Wang Guojun [3769 0948 0971]: "China's Developing Optical
Science and Technology"]

[Text] Since its foundation, our country's optical science and technology
have undergone considerable development.

Before Liberation, our country had only a few older scholars doing
research in optics and only one small plant, employing a few hundred
people, producing simple telescopes. After Liberation, because of the
requirements for development of the national economy, optical science
and technology were taken seriously, and factories were established,
scientific research organizations founded, and the large specialized
schools set up optics and optical instruments specialties, developing
an optical research cadre and an optical instruments industry on a
certain scale. At present our country can produce the special optical
glass needed for optical instruments, and such optical instruments as
microscopes, measuring instruments, recording measuring instruments,
spectrometers, cameras and movie cameras are all produced in lots in a
certain number of plants. Our country has also begun research work on
such new technologies as lasers, infrared and optoelectronics.

Below we list some of the more striking areas of progress.

1. Our country made its first steps in the development of laser
technology rather early. Its first laser was produced in 1961, only a
little more than a year behind foreign countries. Currently our country
has almost all the commonly-used laser devices, and has already used
them effectively in measuring, processing and agriculture. One kind of
work which is a yardstick of the level of a country's laser technology is
high-power lasers and their use to carry out laser-induced thermonuclear
fusion research. In 1973 our country produced a neodymium-glass laser
whose power reached 10 GW with nanosecond emission time and used it
on fusion material, ejecting neutrons. At the time, the countries which

had achieved this result were, in order, the Soviet Union, the United States, France, Japan, Italy and China. In 1974, our country produced a 100-gigawatt laser, and in 1977 it built a 200-gigawatt instrument in which 6 beams simultaneously struck a thermonuclear fusion target; it conducted significant preliminary experiments, and attracted international attention.

2. In order to be able to produce its own modern spectrometers, our country rather early gave attention to the technology for producing their critical component, the optical grating. These gratings require that almost 100,000 parallel lines be cut on a flat plate; the line density is 600-1,200 per millimeter, the spacing must be extremely precise, and the grooves must have a particular shape. For this purpose our country developed a high-precision optical grating engraving machine; only a few nations in the world have such machines. The optical gratings cut by our country with the machine it produced have been used for more than 10 years in domestically produced spectrometers. Currently our country not only can produce original gratings but can also make copied gratings, which are cut according to the pattern of the original grating and are not inferior to it in characteristics, but are much cheaper to produce, so that they can reduce the cost of producing spectrometers. A relatively new achievement is that our country currently can cut rather large-area gratings (120 x 150 mm) whose size is equivalent to a 32mo book. These gratings are used in solar spectrographs in our country's observatories.

3. In order to be able to produce modern high-precision measuring instruments (such as theodolites with accuracies to within 1 second and distance-measuring instruments with accuracies to within 1 micrometer), our country developed its own high-precision circular division and length graduation machines. The circular division scribing machine and corresponding length-measuring equipment developed by our country employ a new principle, and the angularly divided disks calibrated with them are accurate to within 0.2 seconds. The recording spectrometer gratings and precision scales produced with the length-gradation machine have a measuring accuracy on the order of 5 micrometers, but in order to automate and digitize measurement, in addition to using optical gratings in the above-mentioned length-measuring equipment, we can also produce circular coding disks whose precision is to within 1 second. A length-measuring device developed by our country using the laser interference principle has an accuracy within 0.2 micrometers.

4. Photometers are used to guarantee that various light sources and illumination meet the necessary technical requirements. The international standard of brightness is the candela. Our country self-reliantly developed, on the basis of the international standard, a brightness standard which uses the black-body radiation produced by platinum at its freezing temperature. Afterwards our country correctly determined luminous power equivalents. This work is at the worldwide

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state of the art and is respected by the international measurement community. We have already laid an effective technical foundation for implementing the new definition of the candela passed last year by the international conference on units.

5. Below we list some products which indicate the level of our country's optical science and technology.

Various achromatic optical glasses, including rare-earth optical glasses, infrared-transmitting optical glasses and special color scattering optical glasses.

Various laser working media including neodymium glasses, rubies, yttrium aluminum garnet [YAG], ADP crystals and the like.

Telescope objective blanks using ling pengzhang [0659 5191 5195] microcrystalline glass with maximum diameters of 2 meters. These glasses are also used in other structural materials which require the absence of temperature deformation.

Optically uniform fused quartz glasses. Various far-infrared and ultraviolet manmade optical crystals such as CaF_2, NaCl, LiF and KRS5.

Various special light sources such as monochromatic cavity spectrometer lamps.

Various optical instruments such as He-Ne lasers, neodymium glass, ruby and YAG lasers, CO_2 lasers and the like.

Various optical components such as flats, prisms, gratings, vacuum-plated multilayer films, interference filters and the like.

8480
CSO: 4008

AUTHOR: LIN Xiangping [2651 6272 1627]

ORG: None

TITLE: "Modern Electronic Reconnaissance Receiving Technology"

ABSTRACT: Reconnaissance receiver is a major equipment in electronic warfare. With progress in microwave, numerical, and integrated circuit technologies, especially the success in recent years in making sonic surface wave and charge-coupled devices, a new generation of reconnaissance receivers has appeared, including digital frequency detection receivers, signal channeled receivers, compressed receivers, sound-laser receivers, sonic surface wave receivers, etc. These instruments for receiving and detecting weak radio signals of various systems of radar, navigation guidance, communications, electronic antagonism, etc. are briefly introduced in separate sections of the paper to explain their theory, characteristics, and technical advancement.

AUTHOR: JIANG Xiangliu [5592 5046 0362]

ORG: Beijing Municipal Institute of Semiconductor Devices

TITLE: "Polycrystal Silicon Emitter Region Bipolar Logic Integrated Circuits"

ABSTRACT: This paper reports experiments of designing, work procedure, and test data of TTL gate circuit. The experimental results indicate that the polycrystal silicon emitter region transistor in the circuit has suitable D.C. characteristic and superb high frequency property. The adoption of poly-crystal silicon emitter region structure and the manufacturing technique is favorable for further improving the integration density and switch speed of bipolar logic integrated circuits.
This paper was received for publication on 21 February 1980.

AUTHOR: ZHANG Zhaoyang [1728 0340 2294]

ORG: Shanghai Industrial University

TITLE: "Theory and Application of Ultrasonic Imaging"

ABSTRACT: Due to light diffusion and absorption action of water, the visible distance of common underwater television with light as carrier is only about 3 m to cause it to be not usable in murky, turbulent, and deep waters. Ultrasonic wave, the wavelength of which is much greater than light wave, can be transmitted in these waters or even in solids, however. For many years, therefore, it has been hoped that ultrasonic wave may one day be used as the carrier for underwater television. The theory and the current applications of ultrasonic wave imaging [acoustic imaging] are discussed in general terms, in the paper.

AUTHOR: HU Liuying [5170 2839 5391]

ORG: China University of Science and Technology

TITLE: "A Type of Wide Frequency Band Current Transformer"

ABSTRACT: For the purpose of measuring and observing various pulse currents of large power pulse modulators, the author and colleagues designed and made a wide frequency band current transformer. The theory of pulse current measurement with the transformer is explained, including the structure of one such transformer.

AUTHOR: LI Xiuqiong [2621 4423 8825]

ORG: None

TITLE: "Microprogramming Control"

ABSTRACT: The traditional form of control of electronic computers is called composite logic control, which is a network of gate circuits and time sequence circuits (counters, triggers, memories, etc.) to dispatch suitable control signals to a suitable space at a suitable time in a very fast speed. The various instructions and control signals interfere with one another a great deal to produce a large quantity of computation and once a control device has been designed, it is extremely difficult to add or revise a single instruction unless the complete controller is changed. This characteristic makes it especially difficult for large scale integrated circuitry. The idea of microprogramming to control the circuit used in controlling the computer was proposed as early as 1951, but it was not until the appearance of ROM [read-only memory] before the idea became practical. This paper explains the concepts of microprogramming and macroprogramming. Microprogramming is the sum of microinstructions which are stored in ROM. Computers with microprogramming control may be slower unless high speed circuitry for ROM and instruction overlapping methods are adopted in the design.

AUTHOR: SONG Qingxi [1345 1987 3556]

ORG: Department of Physics, Nankai University

TITLE: "Small Microwave Seed Breeder"

ABSTRACT: Since 1974, the Department of Biology of the university has searched for methods of combining γ ray and microwave for seed treatment to obtain a high rate of mutation induction as well as to reduce radiation damage. This work was reported in YICHUAN XUEBAO No 4, 79. Microwave integrated circuit was used to make the microwave seed breeder which is small, light weight, and low cost. In 1979, the Genetics Teaching and Research Office of the Department of Biology used the breeder made by the author and colleagues to treat wheat seeds. A photo in the paper depicts seedlings of seeds irradiated with Co^{60} -γ only and those irradiated with a combination of Co^{60} -γ and microwave in the machine described in the paper. Due to the low power consumption of the machine, 3-4 breeders may be operated on a D.C. stable voltage source of 12 V, 2A.

AUTHOR: None

ORG: None

TITLE: "Electronic Products"

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY]
in Chinese No 7, 10 Jul 80 pp 44-46

ABSTRACT: Eight short items are included in the paper describing major cha-
racteristics and technical properties of the following instruments: (1) TO11
switch type standard attenuator made by Weifang Electronic Instrument Plant;
(2) Equi-radius automatic control device for LZ-30 single crystal furnace
made by Zhejiang Wenzhou Radio 8th Plant; (3) SO3 and SO6 oscillograph cor-
recting device made by Guizhou Dujun City Nanhun Instrument Plant; (4) A
new fast drying resistance paint made by Beijing Municipal Paint Materials
Research Institute; (5) JG-1 laser training bullet made by Jiangxi Jingdezhen
Photoelectrical Plant; (6) CS-1 double-layer capacitor made by Harbin 1449
Research Institute; (7) JD-400 plasma scattering instrument [for vacuum metal
film plating] made by Jiangsu Feng County Electronic Equipment Plant; (8) W140
high resistance high voltage metal glass glaze potentiometer made by Shaanxi
Xianyang Huaxing Instrument Plant. Photos of most of the above instruments
are included.

AUTHOR: None

ORG: None

TITLE: "Explanation of the Front Cover

SOURCE: Beijing DIANZI KEXUE JISHU [ELECTRONIC SCIENCE AND TECHNOLOGY]
in Chinese No 7, 10 Jul 80 p 15, front cover

ABSTRACT: SU Wenrui [5685 2429 3843], an engineer of the Tianjin Municipal
Radio First Plant studied and designed the DS37 6-digit Direct Current Numerical
voltmeter which is being produced by that plant. Its measuring range is DC1 μV
$\sim$ 1000V with a precision of $\pm$ 0.004% and a coded output. The instrument reaches
the advanced level and is welcomed by related scientific research organizations,
production units, and teaching departments. The front cover of this issue is
a photo of the engineer and the instrument he made.

6168
CSO: 4009

AUTHOR: FU Chengyi [0265 2110 5030]
           CHEN Yuntai [7115 6663 3141]
           CHEN Yong [7115 9581]

ORG: FU of the Institute of Geophysics, Chinese Academy of Sciences; CHEN Yuntai and CHEN Yong both of the Institute of Geophysics, State Seismological Bureau

TITLE: "Research on the Physics of the Earthquake Foci"

TEXT OF ENGLISH ABSTRACT: The development of research on the physics of the earthquake foci since the founding of the People's Republic of China is briefly surveyed. The paper consists of three parts: (1) field observations of phenomena related to the focal processes and their interpretations; (2) theoretical studies of the earthquake foci; and (3) experimental studies of the physical phenomena associated with rock fracture.

AUTHOR: FANG Jun [2455 0193]
           XU House [6079 0624 3419]
           ZHANG Chijun [1728 6375 6511]

ORG: All of the Institute of Geodesy and Geophysics, Chinese Academy of Sciences

TITLE: "Research on Gravimetry and Figure of Earth in China"

TEXT OF ENGLISH ABSTRACT: This paper summarizes the gravimetrical works which have been done during the 30-year period following the founding of the People's Republic of China. First of all, we have accomplished the general gravity survey throughout the country. In addition, very dense gravity surveys were carried out around the astronomical points of the astro-geodetic nets in order to provide the precision for the calculations of the astro-gravimetric levelings. Other surveys were also done for special purposes, such as for geophysical prospecting and other scientific research. Maps of astro-geodetic height anomalies obtained by the astro-gravimetric levelings were completed. Maps of free-air and Bouguer anomalies are now under compilation. For theoretical research, much work has also been carried out.

AUTHOR: ZHU Gangkun [2612 1511 2492]

ORG: Institute of Geophysics, Chinese Academy of Sciences

TITLE: "On Some Advancement of Chinese Geomagnetism and Aeronomy during 1949-1979"

TEXT OF ENGLISH ABSTRACT: This paper gives a brief account of some advance-ment in the field of geomagnetism and aeronomy in China during the period 1949-1979. The review covers the following 14 headings: (1) establishment of geo-magnetic observatories; (2) geomagnetic surveys and charts; (3) geomagnetic transient variation and geomagnetic storm prediction; (4) rock magnetism, paleomagnetism and archeomagnetism; (5) magneto-telluric prospecting and re-lated problems; (6) magnetic prospecting and interpretation of data; (7) some research on geomagnetic instruments; (8) search for seismo-magnetic relations; (9) statistical analyses of solar-terrestrial relations; (10) structure of upper atmosphere and determination of ozone layer; (11) ionospheric measure-ments and analyses; (12) structure and disturbance of magnetosphere; (13) studies on cosmic ray time variations; and (14) retrospect and prospect.

AUTHOR: ZENG Rongsheng [2582 5816 3932]

ORG: Geophysical Institute, State Seismological Bureau

TITLE: "A Review of Crustal and Upper Mantle Research in China"

TEXT OF ENGLISH ABSTRACT: Because China has been considered to be a special tectonic unit in the global tectonic theory, its crustal and upper mantle structures are interesting to many geophysicists and geologists. This article reviews briefly the research works of studying the physical properties and structures of the crust and upper mantle in China that have been carried out in the past 20 years.

The seismic techniques were considered as the main method for probing the deep structures. The subcritical seismic reflected waves were recorded and analyzed in some regions. It was reported that the high-velocity and low-velocity layers were identified in several regions.

Compared with the great territory of China, both the field works and theoret-ical research are far short of the need for practical purposes. It is

emphasized that a national project for probing the crust and upper mantle of China is greatly needed, and should be carried out as soon as possible.

AUTHOR: TENG Jiwen [3326 0679 2429]

ORG: Institute of Geophysics, Chinese Academy of Sciences

TITLE: "Geophysical Investigations of the Earth's Crust and Upper Mantle in China"

TEXT OF ENGLISH ABSTRACT: Geophysical studies of the earth's crust and upper mantle in China are important in the understanding of the global plate tectonics and its dynamical system of the whole region. In this paper, the results of such investigations by means chiefly of explosion seismology, magneto-telluric measurements, gravity surveys and aeromagnetic surveys, etc., during the past 30 years have been discussed. Finally, the future tasks and prospects of geophysical investigations of the earth's crust and upper mantle in China are mentioned.

AUTHOR: FANG Weiqing [2455 5588 7230]

ORG: None

TITLE: "Progress of Earthquake Prediction Research in China"

TEXT OF ENGLISH ABSTRACT: The present paper describes briefly the development of seismological work in China in the past 30 years, especially concerning the advances in earthquake prediction obtained in the past 13 years. In order to raise the level of prediction, the author has attempted to pinpoint some important problems to be resolved and their technical approaches in the current work.

AUTHOR: LU Banggan [4151 6721 1626]
XIE Jianming [6200 0494 7686]

ORG: None

TITLE: "Geophysical Exploration Work for Oil and Gas in China--Past and Future"

TEXT OF ENGLISH ABSTRACT: The course of development of the geophysical exploration for oil in China for the past 30 years since the founding of the People's Republic of China is briefly described in this paper. The technical and geological achievements are reviewed according to various stages, as the work started in west China and moved toward northeast and north China historically.

The authors also try to present their views with respect to the future of the application of geophysical methods to oil and gas exploration in China.

AUTHOR: YUAN Xuecheng [5913 1331 6134]

ORG: None

TITLE: "Geophysical Exploration of Metallic Ore Deposits in China for the
Last 30 Years"

TEXT OF ENGLISH ABSTRACT: This paper gives an account of the application of
all kinds of geophysical methods to the reconnaissance survey and prospecting
for metallic ore deposits in China during the past 30 years. Presented are
certain cases of successful applications and also unsuccessful ones, experi-
ences and lessons.

Further technical development directions based on the particular topographic
and geological conditions and types of deposits in China are pointed out with
special emphasis on basic research of new methods and new applications.

AUTHOR: LIU Guangding [0491 0342 7844]

ORG: None

TITLE: "Marine Geophysical Exploration in China and Its Prospects"

TEXT OF ENGLISH ABSTRACT: In celebration of the 30th anniversary of the found-
ing of the People's Republic of China, the author briefly reviews the develop-
ment of marine geophysical exploration in China and discusses its progress and
prospects.

AUTHOR: YANG Guangqing [2799 0342 1987]
         ZHU Ying [2612 5391]

ORG: Both of the Aerogeophysical Brigade, State Bureau of Geology

TITLE: "Aeromagnetic Survey for Geological Reconnaissance Work in China"

TEXT OF ENGLISH ABSTRACT: Aeromagnetic survey in the People's Republic of China has come a long way in the past 26 years. Up to the end of 1978, we had flown about 7 million line-kilometers, and the area actually covered amounted to about 7.5 million square kilometers (including offshore surveys 1.2 million square kilometers in area). Now, the total number of aircraft used for aeromagnetic surveys has reached nearly 30 per year, and correspondingly there have been organized brigades of aerogeophysical research.

Aeromagnetics has played an important role in the search for industrial minerals. Local aeromagnetic anomalies were found in about 20,000 localities, of which 3.5 percent were later verified as magnetite deposits or other useful metallic ore bodies. By use of indications given by the aeromagnetic anomalies, more than 240 iron and other metallic deposits have been discovered, of which

[Continuation of DIQIU WULI XUEBAO Vol 22 No 4, Oct 79 pp 374-382]

41 percent are of large or moderate scales. Aeromagnetic surveys also had great success in the search for oil/gas structures. Almost all of the oil/gas bearing sedimentary basins were covered by aeromagnetic surveys, the area covered amounting to nearly 4.8 million square kilometers (including 1.2 million square kilometers offshore). In exploration of such well-known oil fields as Daqing, Shengli, Dagang, etc., aeromagnetic surveys have played an important role. The effectiveness of aeromagnetic surveys for the study of geotectonics and deep crustal structure was verified, not only on theoretical basis but also in practical applications. By use of aeromagnetic mapping, large deep faults were located. They are important tectonic features and possible indicators of mineralization.

Finally, the prospect of the development of aeromagnetic surveys in China is discussed.

AUTHOR: WEI Siyu [7614 2448 4416]
        TONG Wei [0157 0251]
        WANG Jiyang [3076 7162 2543]
        ZHANG Mingtao [4545 6900 7118]

ORG: WEI of the Institute of Geophysics, Chinese Academy of Sciences; TONG
of Beijing University; WANG of the Institute of Geology, Chinese Academy of
Sciences; ZHANG of the Integrated Survey Commission of Natural Resources,
Chinese Academy of Sciences

TITLE: "Present State and Future Prospects of Geothermal Investigations in
China"

TEXT OF ENGLISH ABSTRACT: In this paper, the distribution of geothermal activ-
ities in China in relation to tectonic structures is discussed. Prospecting of
geothermal resources and their utilization and the present state of theoretical,
observational and experimental work in geothermic studies are reviewed.

Finally, the future tasks are suggested and the prospects of geothermic research
in this country are proposed.

AUTHOR: LONG Xianling [7893 0752 7227]
        HOU Jiechang [0186 2638 2490]

ORG: Both of the Department of Space Physics, Wuhan University

TITLE: "On the Frequency Variation of Radio Waves Reflected from the
Ionosphere"

TEXT OF ENGLISH ABSTRACT: According to the general considerations, the effect
of the ionosphere on the frequency variation of the reflected HF radio waves
consists of two parts, the differential effect, which depends only upon the
state of the medium at the point of reflection, and the integral effect, which
depends upon the states of the media along the whole ray path. In the present
paper, a study of the mechanism responsible for both effects is made. The
conclusion is that only the integral effect exists while the differential ef-
fect does not. According to this conclusion, some experimental results may
be explained. Problems relating to the TID's research by means of the Doppler
measurement have also been discussed.

AUTHOR: CHEN Zheming [7115 0772 2494; deceased]

ORG: None

TITLE: "The Differential Operator and Integro-Differential Equation of the Thermospheric Tides"

TEXT OF ENGLISH ABSTRACT: In this paper, the differential operator of thermospheric tides for which the effects of the average wind and wind shear are taken into account has been derived. From the inversion of the finite Hankel transform, the integro-differential equation for the thermospheric temperature is obtained, and this integro-differential equation can be solved by using Green's function.

AUTHOR: XIONG Guangchu [3574 0342 2806]

ORG: None

TITLE: "On the Theory of the Relationship between the Spectrums of the Magnetic and Gravity Anomalies of 2-D Bodies and Those of 3-D Bodies"

TEXT OF ENGLISH ABSTRACT: Let $F(x-\xi, y, z, \eta, \zeta, \alpha, \ldots)$ be the anomaly of a layer with small thickness in the x-direction. If the anomalies of the bodies can be expressed by

$$T(x, y) = \int_a^{a+2c} F(x-\xi, y, z, \eta, \zeta, \alpha, \ldots) d$$

$$T(y) = \int_{-\infty}^{\infty} F(x-\xi, y, z, \eta, \zeta, \alpha, \ldots) d$$

then we have

$$T(v) = \frac{1}{2c} T(u, v) \Big|_{u=0}$$

where

$T(v)$--spectrum of $T(y)$

$T(u, v)$--spectrum of $T(x, y)$

(x, y, z)--coordinate of point of observation

(ξ, η, ζ)--coordinate of a point of the body
2c--the width of the body in x-direction.

If $2c = d\xi$, the body will be the layer itself; if $2c = d\xi$ and the area of the layer tends to zero, then the body will be a point; if $2c = d\xi$ and the layer has no width, then the layer becomes a curve.

For a body of complex form, we may treat it as a collection of some simple bodies, each of which satisfies the above-mentioned conditions, then

$$T(0, v) = \sum_m 2c_m T_m(v)$$

where $2c_m$ is the width of the mth simple body in the x direction, $T_m(v)$ is the spectrum of $T_m(y)$, which is the corresponding 2-D anomaly of the mth body.

AUTHOR: WU Jiayi [0702 0163 5065]
         YU Shujun [6735 2562 0689]
         HE Shuyun [0149 3219 7301]

ORG: All of the Institute of Geophysics, State Seismological Bureau

TITLE: "The Correlation of Earthquake Occurrence between Northeastern China and Japan"

TEXT OF ENGLISH ABSTRACT: In this paper, major earthquakes which occurred in northeastern China and Japan and its vicinity during the period from 1918 through 1976 are compared. It is found that there is a good correspondence of earthquake occurrence between the above two regions. Generally, great earthquake series of magnitude 7-8 initially occur along the Japan Trench, then deep-focus earthquakes with depths more than 300 kilometers take place under the west part of the Japan Sea, and finally major shallow earthquakes of $M \geq 6$ appear in northeastern China. A statistical analysis was made for 14 active periods since 1919, and a complex correlation coefficient R=0.82 is obtained which passes the F-test on a high level of significance. Earthquakes along the Japan Trench have a return period of about 30 years. From 1926 until now, the

center of seismic activity along the Japan Trench has drifted northward for 3-4°. In the interim, the earthquake activity of northeastern China has also drifted northward at the same rate. Various pieces of evidence show that the occurrence of major earthquakes in northeastern China are under the control of the down-going movement of the Pacific plate along the Japan Trench, and it seems possible that there exists a channel of material current between the above two regions in the upper mantle.

AUTHOR: WEI Fengsi [7614 1144 1835]

ORG: Institute of Space Physics, Chinese Academy of Sciences

TITLE: "A Calculation for the Flare-Produced Shock Wave Near the Earth's Orbit Based on Forbush Decrease of Cosmic Rays"

TEXT OF ENGLISH ABSTRACT: In this paper, a model for flare-produced shock wave near the earth's orbit is obtained based on the east-west asymmetry of Forbush decrease amplitude with the longitudinal distribution of parent flares. It is found that the shock wave propagates anisotropically and shows the east-west asymmetry. A region of intensive magnetic field is in the western part of the shock wave and weak in the east. On the other hand, distribution of dynamic parameters and plasma parameters are such that the eastern part is higher than the western part. The flare-produced disturbances have an azimuthal velocity easterly and westerly respectively. Such a model and theoretical inferences from it agree with observational data. It can give a unified and natural explanation for the east-west asymmetry effects of the magnetic disturbances and Forbush decrease of cosmic rays and others. The possible cause of such an east-west asymmetry of flow of flare-plasma is also discussed.

AUTHOR: XIAO Zuo [5135 0146]

ORG: Department of Geophysics, Beijing University

TITLE: "The Resonance in Afterglow Plasmas and Its Possible Applications to Space Research"

TEXT OF ENGLISH ABSTRACT: A measurement with a resonance probe in the afterglow plasma was carried out and the resonance phenomenon was observed. It was also proved that this phenomenon occurred at plasma frequency without much damping. This is different from what some other authors concluded. It was further shown that this measurement was not affected by probe contamination. The technique can be used in some cases in which space and laboratory plasma researchers may be interested.

AUTHOR: TAI Hongsheng [6733 7703 3932]

ORG: Institute of Space Physics, Chinese Academy of Sciences

TITLE: "The Relation Between Oxygen Green Line Intensity and Oxygen Atom Density in the Upper Atmosphere"

TEXT OF ENGLISH ABSTRACT: The half width of oxygen green line intensity profile and oxygen atom density profile in the upper atmosphere were analyzed. We conclude that the relation between oxygen green line intensity and oxygen atom density could be expressed by $J \propto N^2(0)$, but not by Chapman's results $J \propto N^3(0)$.

AUTHOR: WEI Bailin [7614 2672 2651]

ORG: Seismological Bureau of Guangdong Province

TITLE: "Cause of the Change of Focal Mechanisms of Aftershocks"

TEXT OF ENGLISH ABSTRACT: Some focal mechanisms of aftershocks are generally
similar to those of the main shock while others are remarkably different. This
difference is shown by the change of directions of the P-wave first motions of
the aftershocks and implies a change of stress field in the focal region.

Regarding the cause of this change of focal mechanisms of aftershocks, it is
neither due to rock mass overshoot nor to subsidence following an outflow of
pore fluid, but is due to the shear fracture that is induced by the transformed
stress field when the slipped rock mass triggered the main shock and extended
its effect to the neighboring rock mass.

AUTHOR: WANG Suyun [3076 4790 0061]
         CHEN Peishan [7115 1014 0810]

ORG: Both of the Institute of Geophysics, State Seismological Bureau

TITLE: "A Numerical Simulation of the Present Tectonic Stress Field of China
and Its Vicinity"

TEXT OF ENGLISH ABSTRACT: A calculation of present tectonic stress field of
China and its vicinity as a plane stress problem has been made by means of the
finite element method. The crust of this region is taken as an elastic plate
which is composed of 12 parts with different Young's modulus E, Poisson's ratio
v and thickness T. The whole region is divided into 288 triangular elements.
Five models of boundary conditions of stress and displacement have been con-
sidered, which represent relative values of the stress applied to the region
inside China and its vicinity by the Indian ocean plate, the Pacific plate and
the Philippine sea plate respectively. The values of maximum shear stress ob-
tained from calculation have been compared with the distribution of the strong
earthquakes, and the directions of the maximum compressive principal stress with

that obtained from focal mechanism solutions. The boundary condition which agrees most satisfactorily with the actual has been selected as an available model. The results show that the driving force seems to be mainly due to the Indian ocean plate. It is about two times larger than that of the Pacific plate and the Philippine sea plate respectively.

AUTHOR: WANG Miaoyue [3769 1181 2588]
          LIU Changfeng [0491 7022 7364]
          LI Xiaoyan [2621 2556 3601]

ORG: All of the Institute of Geophysics, Chinese Academy of Sciences

TITLE: "An Application of the Method of Space Domain Filter in Determining Parameters of the Two-Dimensional Magnetic and Gravity Contact Surface"

TEXT OF ENGLISH ABSTRACT: In 1975-1976, Green and Stanley published a method to determine parameters of two-dimensional magnetic and gravity contact surface. In this paper, instead of using difference division to obtain horizontal derivative and Hilbert transformation to obtain vertical derivative, which were used in Green and Stanley's paper, we apply space domain filter. It is explained in theory that satisfactory results may be obtained. Model computation supports the theoretical derivation. In comparison with Green and Stanley's method, the present method can filter out high frequency noise in the data and get equal accuracy in horizontal and vertical derivatives so as to obtain better results in the inverse problem.

AUTHOR: CHEN Zhonghou [7115 0112 0230]
          HE Changli [0149 2490 4409]

ORG: Both of Chengdu Geological Institute

TITLE: "Numerical Interpretation of Resistivity Sounding Curves"

TEXT OF ENGLISH ABSTRACT: Methods of integral transforms and sampling theorem
have been employed to carry out linear filtering of the apparent resistivity
curves. In this way a new resistivity transform function T' and its correspond-
ing curves are obtained. Then, by using the assumed layer parameters (layer
resistivity and thickness), calculation of the function T with automatic fit-
ting, by the optimum method on the DJS-6 electronic computer with the apparent
resistivity field curves for their interpretation can be carried out.

After a brief mention of Ghosh's idea of linear filtering of the apparent
resistivity curve, the difference between the methods of choosing the sampling
interval and the filter coefficients used by other authors and ours has been
pointed out. In addition, the computer block diagram and its applications to
the optimum methods of damped least squares and variable metric are introduced.

Finally, a short discussion of some actual examples of numerical interpretation
of apparent resistivity curves is made.

AUTHOR: ZHOU Xixiang [0719 3356 5980]
        ZHONG Benshan [6988 2609 0810]
        FENG Jingying [7458 2417 5391]

ORG: All of Chengdu Geological Institute

TITLE: "Certain Problems of the Curve-Matching Optimization Method in the
Interpretation of Magnetic and Gravity Data"

TEXT OF ENGLISH ABSTRACT: In this paper, we applied the Quasi-Newton method of
non-linear optimization to the automatic interpretation of magnetic and gravity
anomalies. A comparison of the results of computations indicates that the
Quasi-Newton method is more efficient than damped least squares (Marquardt's)
method in stability of convergence. We also discussed convergence, ambiguity,
choice of models and their parameters and constraints of the curve-matching
optimization method. Three examples of interpretation of magnetic anomalies
by the optimization method are given.

AUTHOR: ZHONG Fudao [6945 1381 6670]

ORG: Guiyang Institute of Geochemistry, Chinese Academy of Sciences

TITLE: "On the Principal Tectonic Evolution of the Continental Crust"

TEXT OF ENGLISH ABSTRACT: It has been suggested that the tectonic movements
in the earth's crust involve not only the short-term cycles but also the long-
term ones. Judging from the available data on isotopic dating and geological
time scales of various continents, there may have existed five chelogenic
cycles separated by an interval of 0.6-1.0 b.y., and their peak age values turn
out to be $\sim$3.6, $\sim$2.6, $\sim$1.9, $\sim$1.1 and 0.2 b.y. throughout the history of the
earth's evolution.

Based on the distribution of the tectonic belts (metamorphic belts and mag-
matism) in various continents as well as their geological ages, it is shown
that the chelogenic cycle II ($\sim$ 2.6 b.y.) is characterized chiefly by tectonic
belts with NNE-NNW trend, the chelogenic cycle III ($\sim$1.9 b.y.) by the NNW-NEE
trend, while in the chelogenic cycle IV the belts had the same trend as those
of chelogenic cycle II. As for the chelogenic cycle V ($\sim$ 0.2 b.y.), its

tectonic belts became relatively complicated, trending both NEE-NWW and NNW-NNE and extending over the Eurasian plate and other areas respectively. The model of principal global tectonic evolution proposed here implies that the continental crust has undergone more than one tectonic event which probably developed along the tectonic trends mentioned above leading to the formation of fault blocks in the old basement.

AUTHOR: LI Ziyin [2621 1311 3009]
          HU Xinkang [5170 1800 1660]

ORG: Both of the Institute of Acoustics, Chinese Academy of Sciences

TITLE: "A Primary Study about the Direction of Acoustical Emission Prior to Earthquakes"*

TEXT OF ENGLISH ABSTRACT: For exploring the direction of acoustical emission sources prior to earthquakes, assuming that the sound velocity is only dependent on depth, a formula for sound source direction can be derived. The formula should be such that the result should agree with that obtained under the condition of constant sound velocity. For simplification, the time differences can be replaced by the actual time differences between two receivers, and the error thus caused can be permitted. In the report, the cross correlation method is introduced to calculate the time difference between two signals. Finally, an actual computed result is given, which shows that the direction of acoustical emission prior to earthquakes is closely related to the future epicenters.

* Also taking part in this study were: TIAN Shixiu [3944 2514 4423], KONG Fanyong [1313 0416 3057], ZHANG Ruwei [4545 3067 1218], ZHANG Boling [1728 2672 0109], LI Jinxi [2621 6855 6932], SHI Jinrui [4258 6855 3843], GAO Jinglai [7559 2529 0171] and REN Jianguo [0117 1696 0948].

AUTHOR: FANG Jun [2455 0193]

ORG: Institute of Geodesy and Geophysics, Chinese Academy of Sciences

TITLE: "The Studies of Earth-Tides--Their Relations to Astronomy and Space Science"

TEXT OF ENGLISH ABSTRACT: The studies of earth-tides are very important as they are the only phenomena in geophysics for which the force producing them can be calculated exactly beforehand and be examined by experimental methods. Since the International Geophysical Year commencing from 1957, great advancements have been attained in this branch of science, both theoretically and experi-mentally. In this paper, a brief account is given of its importance to modern science and achievements which have been attained.

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AUTHOR: LIU Zhenxing [0491 2182 5281]

ORG: Institute of Space Physics, Chinese Academy of Sciences

TITLE: "On Turbulence Structure of Mesospheric and Thermospheric Atmospheres"*

TEXT OF ENGLISH ABSTRACT: This paper describes the spectral ranges of the turbulence of mesospheric and thermospheric atmospheres. It is found that the corresponding spectral ranges at different heights for the turbulences of a similar scale are different from each other. A shift toward the side of the dissipating region occurs with the increase in height. Turbulent spectral distributions at various heights are theoretically calculated. Formulas of turbulence coefficients are derived and a conceptual idea of effective turbulence scales developed. Distributions of turbulence coefficients with height are also computed, which agree very well with those derived from the observed Ar and He distributions at various heights.

AUTHOR: ZHANG Zhaoxian [1728 5128 0341]*

ORG: Institute of Space Physics, Chinese Academy of Sciences

TITLE: "A New Reduction Method for Nocturnal Ionospheric h'-f Curves"**

TEXT OF ENGLISH ABSTRACT: The purpose of this paper is to find an accurate and reliable reduction method for the synchro-reduction domain including 9 to 15 virtual height data above the minimal appreciable frequency f_{min}. For this domain three higher ionization models with two variables are given, whereas six or eight lower ionization models with two variables are given for the ionization below f_{min}. At most, 20 different reduction results may be obtained for each h'-f curve by the least square method. It is possible to select an accurate result from the above calculations. 468 theoretical nocturnal h'-f curves have been reduced. They possess different shapes, critical frequencies f_c, semi-thicknesses H and f_{min}'s, and these theoretical virtual heights have an accuracy of about 0.1 km. The maximal reduction errors of 462 h'-f curves are less than 5 km, whereas those of 6 curves are between 5-9 km.

* Now of the Shanghai Institute of Technical Physics, Chinese Academy of Sciences.

AUTHOR: HUANG Xinyu [7806 0207 2810]

ORG: Wuhan Physics Institute, Chinese Academy of Sciences

TITLE: "A Note on the Generalization of the Appleton-Hartree Formula"*

TEXT OF ENGLISH ABSTRACT: Under the assumption that a corrective factor of the effective electron collision frequency depends on the conductivity tensor of the ionized medium, an elementary function expression for the complex refractive index in a weakly ionized gas with an alternating electric field and a steady magnetic field is derived from the reduced equation of motion of the electrons. This expression is a fair approximation to the Sen-Wyller generalized expression for the complex refractive index, but the computation is simpler.

AUTHOR: JIANG Bangben [5592 6721 2609]

ORG: Beijing University

TITLE: "The Magnetic Field in a Compensated Solenoid"*

TEXT OF ENGLISH ABSTRACT: This paper introduces a coaxially and concentrically combined coil, constructed by a solenoid and a pair of circular coils. In this coil, when the ratio of diameter to length of the solenoid, the ratio of the diameter of the circular coils to the distance between them, the ratio of the diameter of the circular coils and the diameter of the solenoid, the turn ratio of the circular coils and the solenoid or the current intensity ration between them are of specific values, the three main terms, second, fourth and sixth order terms, of the non-homogeneous magnetic field may vanish. The result of calculation shows that the magnetic field of the combined coil may be made more homogeneous and the extent of such homogeneous field is larger than that of the ordinary coil.

* Received 4 July 1979.

AUTHOR: LU Yuanzhong [7120 6678 1813]
          SHEN Jianwen [3088 1696 2429]

ORG: Both of the Seismological Bureau of Anhui Province

TITLE: "A Study of the Earthquake Faulting Process"*

TEXT OF ENGLISH ABSTRACT: A recent trend in research of the mechanical modeling of an earthquake source is to look upon the source as a dynamically extending shear crack. In this paper, the authors have proposed a plane shear faulting model to simulate the rupture process of faulting during an earthquake. In this model, the friction force on the fault plane and the plastic region near the fault tip are considered. By applying the Wiener-Hopf technique and the Cagniard-de Hoop method, the expressions for the displacement and stress are obtained. With the help of the energy balance condition in the small region around the fault tip, the average velocity C of the earthquake faulting and the scale of the plastic region are calculated. The dislocation distribution function on the fault is discussed and the phenomenon that the high frequency components of certain foreshocks increase before great shocks is also explained.

Here, according to the assumed conditions and parameters, the average velocity of the earthquake fault ing, $c = 0.72\beta$, where β is the velocity of the S-wave, and the scale of the plastic region is about 12 percent of the total length of the new fault. As for the seismic wave of such foreshocks, the decrease of half period of the first P arrivals due to the increase of rupture velocity will not exceed 39 percent.

AUTHOR: QUAN Anshu [0356 1344 5771]
          LIU Futian [0491 4395 3944]
          SUN Yongzhi [1327 3057 2535]

ORG: QUAN of the Institute of Geophysics, State Seismological Bureau; LIU and SUN both of the Institute of Geophysics, Chinese Academy of Sciences

TITLE: "Three-Dimensional P Velocity Structure of the Crust and Upper Mantle under Beijing Region"*

TEXT OF ENGLISH ABSTRACT: By use of the teleseismic P arrival times at 15 stations of the Beijing network for 120 events distributed over various azimuths, we studied the three-dimensional P velocity structure under the Beijing region. In calculating the theoretic travel time, we adopted the source parameters given in BISC, and used the J-B model as the standard model of earth. On inversion, we adopted singular value decomposition as a generalized inversion package, which can be used for solving very large over-determined systems of equations Gm=t without resorting to normal equations $G^TGm=G^Tt$. The results are that within the crust and upper mantle under the Beijing region there are

clear lateral differences. In the results obtained by use of data from 1972-1975, it can be seen that there are three different zones of P-velocity. In the southeast Beijing region, P velocity is lower than that of the normal model by 10-14 percent within the crust, and by 8-9 percent within the upper mantle. The northwest Beijing region is a higher-velocity zone, within which the average P-velocity is faster than that of the normal model by about 9 percent. It disappears after entering into the upper mantle. The central part of this region is a normal zone. On the surface, the distribution of these P velocity variations corresponds approximately to the distribution of the overburden. But in the deeper region, the distribution of velocity variation agrees with the distribution of seismicity. It is interesting to note that the hypocenters of several major earthquakes in this region, e.g., the Sanhe-Pinggu earthquake (1679, M=8), the Shacheng earthquake (1730, M=6-3/4) and the Tangshan earthquake (1976, M=7.8), are all located very close to this boundary of these P-velocity variation zones.

AUTHOR: ZHANG Gengji [1728 1649 7535]

ORG: East China Petroleum Institute

TITLE: "Successive Approximation of Electrostatic Field in Inhomogeneous Medium and the Geometrical Factors of Electric Logging"*

TEXT OF ENGLISH ABSTRACT: A successive approximation method solving electrostatic field of inhomogeneous medium is proposed which yields results with increasing accuracy when the number of correction terms increases. The method is verified with a simple example. Geometrical factors are defined as the functional derivatives of apparent resistivity with respect to conductivity. As in induction logging, we derived radial and axial geometrical factors. The integrated radial geometrical factor plott[ ]l against L/d is the approximation of the departure curve. Comparisons between them are provided to show to what extent the approximation is good.

AUTHOR: FU Liangkui [0265 5328 7608]

ORG: None

TITLE: "Some Results of Research of the Horizontal Cylinder in the Magnetic Induced Polarization Method"*

TEXT OF ENGLISH ABSTRACT: The present paper briefly introduces the theories of anomalous magnetic fields of conductive cylinder induced by homogeneous current field in full space and in semi-space. Theoretical formulae and their interpretations are given, as well as calculated profile curves of magnetic resistivity and magnetic induced polarization methods. Experimental results on appropriate models and on copper ore bodies of disseminated types are obtained, which agree well with the theories.

AUTHOR: PO Huarong [2613 0553 2837]
          SHA Shuqin [3097 2885 3830]
          WANG Yanliang [3769 1693 5328]

ORG: All of Changchun Geological Institute

TITLE: "Time-Domain Electromagnetic Response above the Surface of a Homogeneous Earth"*

TEXT OF ENGLISH ABSTRACT: This paper describes the time-domain electromagnetic response above the surface of a homogeneous earth for the application of the impulse type airborne electromagnetic method. The formulations of the response are developed from those of the frequency-domain by the Fourier transform. Both the horizontal and the vertical component of the secondary field were computed with the parameters of the home-made impulse type airborne electromagnetic system. According to the computer results of the time-domain, the diagrams of interpretation are presented in this paper. It can be used to solve two major problems. The first is to interpret the time-domain airborne electromagnetic data measured at different flying altitudes so that the earth resistivity will

be provided. The second is to estimate the time-domain airborne E.M. response, if the earth resistivity is given; therefore, the pseudo-anomalies caused by the change of the flying altitude will be corrected.

AUTHOR: QIAN Shangwei [6929 1424 3837]
          ZHOU Yongming [0719 3057 2494]

ORG: QIAN of Nankai University; ZHOU of the Geodetic Brigade, State Seismological Bureau

TITLE: "Statistical Analysis of the Imminent Earthquake Anomalies Discriminant"*

TEXT OF ENGLISH ABSTRACT: In this paper, the relation between anomalies and errors in imminent earthquake precursors, used in earthquake prediction, is discussed statistically; its deficiency is noted; a better relation that can be used for imminent earthquake prediction is proposed and a test of the relation is provided by analyzing the data of levelling at the Chuxiong Crustal Deformation Station and that of electrical resistivity at the Changli Observatory.

AUTHOR: LUO Dingjun [5012 1353 6511]

ORG: None

TITLE: "Equivalence of Two Different Definitions of Isolated Blocks"

TEXT OF ENGLISH ABSTRACT: In this paper first we introduce two different
definitions of isolated blocks used in the literature, and show that the iso-
lated blocks so defined are different. Then we prove that these two defini-
tions are equivalent, i.e., if an isolated block of one kind exists then so
does that of the other, and vice versa.

AUTHOR: YU Zhongming [0205 0022 2494]

ORG: None

TITLE: "Stability of Nonlinear Stochastic Difference Equation"

TEXT OF ENGLISH ABSTRACT: In the paper which is based on Bucy's work, we dis-
cuss stability and asymptotic stability problems of nonlinear stochastic dif-
ference equation, where stability and asymptotic stability are in the sense of
probability. We divide conceptions of stability and asymptotic stability of an
equilibrium state with respect to some set of initial random vectors into two
types; one type is called strong and the other is called weak. We give suf-
ficient conditions for every type. We build a connection between potential
and strong asymptotic stability.

AUTHOR: PENG Yunlou [1756 0061 2869]
         CUI Lianshu [1508 6647 4549]

ORG: None

TITLE: "A Possible Observational Test of the Beam Models"*

TEXT OF ENGLISH ABSTRACT: The double-lobe structure is one of the most impor-
tant structure forms of extragalactic radio sources. At present, there are
some physical models for explaining this double-lobe structure. How to test
these models by means of observation is a very important subject. This paper
searches for the possibility of such a kind of test theoretically. In this
paper, on the basis of beam models, the inverse-compton scatters of high energy
electrons in beam with the cosmic background photons and the synchrotron pho-
tons of extragalactic radio sources are discussed, and the formulae for calcu-
lating these radiations are derived. The calculated results show that radia-
tions are in the X-ray region and with strong directivity about the beams direc-
tion. The intensity of these radiations is above the sensitivity of the X-ray
probe. Therefore, we suggest that it is probably an effective method for

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testing beam models to seek for some X-ray radiations of the complex sources.

The parameters of the radio source cygA were referenced in calculating the
intensity of these radiations.

AUTHOR.   GONG Xiufen [7895 4423 5358]
          ZHU Zhemin [2612 0772 3066]
          DU Gonghuan [2629 0501 3562]

ORG: None

TITLE: "Nonlinear Interaction of a Finite Amplitude Wave with a Small-Signal Wave in the Air"*

TEXT OF ENGLISH ABSTRACT: In the present article, a series of nonlinear phenomena that occur while a finite amplitude wave of frequency f_1 interacts with a weak-signal wave of frequency f_2 has been theoretically analyzed. Experimental observation was carried out in a 9 M long progressive wave tube with square section 4 x 4 cm^2 under the conditions of f_1 = 980 c/s, SPL_1 = 130-150 dB, f_2 = 4000 c/s, $SPL_2 < 100$ dB, where SPL_1 is sound pressure level of finite amplitude signal f_1 and SPL_2 that of weak signal f_2.

Results obtained were as follows: (1) Owing to the nonlinear interaction, weak signal wave is suppressed and its amplitude is reduced. It has been found that maximum suppression of signal f_2 is 47 dB.   (2) With the reduction of amplitude

signal f_2 sideband components occur, but its amplitude distribution is non-symmetrical to the sideband center f_2.   (3) Relationships of two sideband amplitudes with sound pressure level of intense waves are obtained.   (4) The total energy of the weak signal and the sideband components is only slightly larger than the energy of the primary weak wave, and this constitutes an approximate conservative system.

The results of the experiment coincide quite well with the theoretical prediction.

AUTHOR: YOU Xiaozeng [3266 2400 2582]
        LI Chongde [2621 6850 1795]
        YUAN Chuanrong [5913 0278 2837]
        YU Yaohua [0151 5069 5478]
        BAO Jiawei [0545 1367 0251]
        MO Tianlin [5459 1131 7792]

ORG: None

TITLE: "Some Structural Characteristics of Metaldehyde"*

TEXT OF ENGLISH ABSTRACT: Metaldehyde, an ice-nucleating agent of supercooled
clouds, has been analyzed by X-ray diffraction, infrared spectrometry, nuclear
magnetics resonance, mass spectrometry and differential thermal analysis. The
results show that it is essentially a type of tetramer and its geometric struc-
ture is that of the MI configuration proposed by Craven et al. In order to
investigate further its ice-nucleating mechanism, molecular electronic struc-
ture has been computed by use of quantum chemistry method of CNDO/2.

*The staff of the Institute of Chemistry, Chinese Academy of Sciences, assisted
in some measurement and testing.

AUTHOR: GU Qingchao [7357 1987 6389]
        DAI Qingping [2071 1987 1627]
        SHAO Yufang [6730 3022 5364]
        SUN Gang [1327 4854]
        ZHOU Jianhua [0719 1696 5478]
        OUYANG Yi [2962 7122 3015]
        WU Zonghan [0702 1350 3352]
        LU Minqiang [4151 3046 1730]

ORG: OUYANG, WU and LU all of the Physics Faculty Research Section, Nanjing
Engineering College

TITLE: "Studies on Polypropylene Film Electrets"*

TEXT OF ENGLISH ABSTRACT: Using 15 μm thick biaxially oriented polypropylene
film, thermoelectrets and corona-charged electrets were prepared under different
conditions. Surface charge density and depolarization current were measured,
and the change of the former with time and that of the latter with temperature
were determined. Studies on the influence of polarization conditions on surface

charge density were carried out, with the merits of the two methods, heat polarization (film first heated and then polarized) and corona discharge compared.

* CHEN Qingmin [7115 1987 3046], AO Shuiquan [2407 3055 3123] and LIU Yucheng [0491 3768 2052] took part in the work.

AUTHOR: WANG Huiji [3769 1979 1213]
          ZHOU Hongbing [0719 7703 1755]
          SONG Rongjun [1345 5554 0689]
          JIANG Huxiang [5592 5706 4382]
          CHEN Ling [7115 3781]
          DOU Runlu [4535 3387 4845]

ORG: None

TITLE: "Biological Characteristics of Spartina anglica (I)--Preliminary Observation on the Structure of the Leaf"*

TEXT OF ENGLISH ABSTRACT: 1. In the cross section of the leaf of Spartina anglica there is a well developed chlorenchymatous bundle sheath and a definite mesophyll layer surrounding the bundle sheath is often radially arranged. 2. In contrast, the chloroplasts in the bundle sheath differ from the chloroplasts in the surrounding mesophyll cells. The bundle sheath chloroplasts are larger and very rich in starch. The smaller chloroplasts of the mesophyll cells contain little or no starch.

3. The chloroplasts of both the mesophyll and the bundle sheath cells contain many grana.

4. The salt glands occur on both the adaxial side and the abaxial side of the leaf in Spartina anglica. The salt gland is composed of two cells, a large basal cell and a smaller outer dome-shaped cap cell positioned on a neck-like protrusion of the large basal cell. Both the basal cell and the cap cell have dense cytoplasm. The basal cell has numerous mitochondria and infoldings of the plasmalemma which extend into the basal cell and partition the basal cell cytoplasm. The cap cell has no partitioned membrane system.

5. The cuticle on the adaxial epidermis of the leaf is raised into large numbers of small papillae, but the abaxial cuticle is quite smooth.

AUTHOR: XIAO Xinsheng [5618 0207 3932]
           YU Qixiang [0151 0796 4382]
           ZHANG Zuxuan [1728 4371 2537]

ORG: None

TITLE: "The Study of Relations between Ammonia Content of Brain and Convulsion by Strychnine in Rats"*

TEXT OF ENGLISH ABSTRACT: Many investigators gave different opinions on the question of whether the increase of ammonia content of the brain is the cause or effect during a convulsion. In the present paper, the experiments show the ammonia content of different regions of the brain in convulsive rats was markedly increased. When sodium glutamate and strychnine were injected intraperitoneally simultaneously, convulsion happened as usual despite the decrease of the brain ammonia content, except for the diencephalon and mesencephalon. In order for the brain ammonia content to increase, two groups of rats were forced to swim in water for two hours and injected with NH_4Cl intraperitoneally separately; it is of interest that convulsions did not occur. Our experimental data

might help to form such an idea that the increase of the brain ammonia content is the effect, but not the cause, of convulsions.

* ZONG Han [1350 3466] of the Institute of Physiology, Chinese Academy of Sciences, provided counsel.

AUTHOR: FANG Yesen [2455 6777 2773]
           PENG Yaming [1756 0068 7686]
           LIN Chengyi [2651 2110 3015]

ORG: None

TITLE: "The Study of Basalt and Its Xenolith of Mt. Fang in Liuhe County, Jiangsu Province"

TEXT OF ENGLISH ABSTRACT: Mt. Fang is a volcanic cone with comparatively un-broken morphology. It was formed in Pliocene of the Tertiary period. The volcanic cone is composed of lower olivine basalt and melanodiabase formed in the side eruption of the early cycle, the upper olivine basalt formed in effu-sion of the late cycle from the main crater, and of leucodiabase filling the center vent and the concentric cracks. This paper, through studying its petro-graphic and petrochemical character in detail, has shown that the basalt of Mt. Fang in Liuhe belongs to the alkali basaltic series.

This paper, through studying the mineralogical and chemical character of the ultramafic xenolith of picotite lherzolite, augite megacrystal, etc., and the

xenolith of quartz crystal has also considered that the xenolith of quartz crystal is captured from the upper layer of the earth's crust, and the ultra-mafic xenolith was brought from the peridotite layer of the upper mantle. Therefore, the writers come to the conclusion that the basaltic magma is originated from a rather deep source and the basalt is the product of the upper mantle.

AUTHOR: LIU Changsheng [0491 7022 4141]
           LIU Wenbao [0491 2429 0545]

ORG: None

TITLE: "The Measurements of Size Distribution of Fog Droplets by Laser Holography"*

TEXT OF ENGLISH ABSTRACT: This paper describes the recording and reconstructing by the holograms in measuring particle size, and gives the schematic diagram of laser fog disdrometer and the results of measuring spray drops, of which the smallest that can be measured is 5μ in diameter. In addition, it shows that the reconstructed image of 3μ in diameter methyl methacrylate particles recorded by He-Ne laser as well as the reconstructed image of larger methyl methacrylate particles are appearing in rings as described by the theory. The recording ability and errors of the disdrometer are also discussed in this paper.

AUTHOR: LI Bingan [2621 3521 1344]
         RUAN Tongze [7086 0681 3419]

ORG: Both of the Institute of High Energy Physics, Chinese Academy of
Sciences

TITLE: "Wave Functions without SU$_6$ Symmetry in the Straton Model and Their
Applications"

TEXT OF ENGLISH ABSTRACT: On the basis of the straton model, using the general
groundstate wave functions of mesons and baryons given in reference [2], we
have constructed under some specific assumptions the meson and baryon wave
functions without SU$_6$ symmetry. We apply these wave functions to explain the
mesonic and baryonic properties of the electromagnetic and weak interactions;
many results obtained are in agreement with the experiments.

By using the $1/2^+$-baryon wave functions without SU$_6$ symmetry, we obtain an

anomalous magnetic moment for the proton. There is no need to introduce an
anomalous magnetic moment for the straton in the effective Hamiltonian of
electromagnetic interaction between stratons. Similarly, the magnetic moment
of the neutron can also be explained.

AUTHOR: LIU Hanzhao [0491 3352 2507]

ORG: Nankai University

TEXT OF ENGLISH ABSTRACT: Important implications of the fine structure of
inclusive spectra (to be called inclusive and semi-inclusive spectra) of nearby
particles, which represent the local distributions of nearby particles in
three-dimensional phase space with rapidity y and transverse momenta $P_{\perp x}$, $P_{\perp z}$
as independent coordinates are explained, and some basic features of the fine
structure are found, namely, sum rules and the generalized form of the Feynman-
Yang scaling.

One of the sum rules, for example is:

$$\int f_{(1;k)}(s, x_1, P_{\perp 1}, \ldots x_k, P_{\perp k}) \frac{d^3 P_1}{\omega_1} \cdots \frac{d^3 P_k}{\omega_k} \underset{(x_1 \leqslant x_2 \leqslant \ldots \leqslant x_k)}{} = \sum_{n=k}^{\infty} (n-k+1) \frac{\sigma_n}{\sigma(s)}$$

where $f_{(1;k)}$ denotes the normalized invariant inclusive cross section of k
closely neighboring particles. It follows that the inclusive spectra of nearby
particles are qualitatively different from the usual ones.

The generalized form of the Feynman-Yang scaling for the case of k closely
neighboring particles, for example, is:

$$f_{(1;k)}(s, x_1, P_{\perp 1}, \ldots x_k, P_{\perp k}) \longrightarrow \infty, \quad (s \to \infty, \; x_1 \leqslant x_2 \leqslant \ldots \leqslant x_k)$$

where "$\longrightarrow \infty$" denotes "approaches a definite limit." For k=2, the existing ex-
perimental data for the rapidity gap-length distributions show that for FNAL
energies, $f_{(1,k)}$ is already close to its limiting form. The inclusive (semi-
inclusive) spectra of nearby particles may be able to reflect effectively short-
range correlation effects.

AUTHOR: XU Jianming [1776 1696 6900]
          CAI Zhiguo [5591 1807 0948]

ORG: Both of the Institute of High Energy Physics, Chinese Academy of
Sciences

TITLE: "The Tracking Problem in Power Supplies for Separated Function Magnet
Systems of Fast Cycling Synchrotrons"

TEXT OF ENGLISH ABSTRACT: In this paper, we describe a proposal for solving
the tracking problem in power supplies for separated function magnet systems
of fast cycling synchrotrons. Formulas for calculating the tolerances of the
parameters which influence tracking accuracy are given.

AUTHOR: ZHU Wei [2612 0251]
          LU Jizong [7120 4949 1350]
          ZHANG Minsheng [1728 3046 3932]
          YIN Pengcheng [3009 7720 4453]

ORG: ZHU of Shanghai Normal University; LU and ZHANG both of Shanghai
Teachers' College; YIN of Fudan University

TITLE: "A φ^4 type Bag Model of Hadrons--The 'Rubber Bag' Model (I)--Theory"

TEXT OF ENGLISH ABSTRACT: In this paper a new bag model of hadrons, the "Rubber
Bag" model, is proposed. This model treats each hadron as a bag system in the
center-of-mass frame. The bag, with its outer radius R_c and inner radius ($R_c -
D$), is characterized by its "average surface tension" T and quarks are con-
fined in it "temporarily." This model is a field theoretic which can
also be used for quantitative calculations. Thus, it has the merits of the
SLAC bag model as well as those of the MIT bag model.

AUTHOR: LI Yangguo [2621 2254 0948]
LIU Xianhui [0491 2009 6540]
LIN Chuncan [2651 2504 3503]

ORG: All of the Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "Elastic Scattering and Polarization of High Energy Proton from ^{4}He"

TEXT OF ENGLISH ABSTRACT: Using the Glauber theory including the nucleon spin effects, the proton-^{4}He elastic scattering differential cross section and polarization at energies in the region of 0.35-23.1 GeV are calculated. The results show that, after including the spin-flip terms, we can explain the differential cross section data and describe qualitatively the polarization.

AUTHOR: ZHAO Baoheng [6392 0202 1854]
YAN Mulin [7051 3092 7207]

ORG: Both of the University of Science and Technology of China

TITLE: "Canonical Quantization of Gauge Fields (II)--Spontaneously Broken Gauge Fields"

TEXT OF ENGLISH ABSTRACT: In R_ξ gauges a SU(2) spontaneously broken gauge theory is quantized within the canonical formalism, and the gauge compensating term is derived.

AUTHOR: XU Bowei [6079 0130 1218]

ORG: Lanzhou University

TITLE: "Space-Time Property of Fermion Number"

TEXT OF ENGLISH ABSTRACT: Enlarging the dimensionality of Minkowski space from 4 to 5, and relating the rest mass of particle with x_5 as $m = -i\frac{\partial}{\partial x_5}$, we discuss the 5-dimensional non-linear conformal group $C(M_5)$ under which $dx_1^2 + dx_2^2 + dx_3^2 - dx_0^2 + dx_5^2 = 0$ is invariant. The $C(M_5)$ group is isomorphic to the linear group $SO(5, 2)$ from which we study the space-time property of Fermion number, and the relations between half-integral (integral) spin and odd (even) Fermion number are obtained.

AUTHOR: WU Jingyuan [0124 4842 0337]
         CHEN Zhongmo [7115 0022 6206]
         ZHANG Zixian [1728 1311 6343]

ORG: All of the Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "A Sensitive Method to Distinguish the Spin of the Heavy Lepton τ from Its Two Body Decay Energy Spectra"

TEXT OF ENGLISH ABSTRACT: We point out that in $e^+ + e^- \rightarrow \tau^+ + \tau^-$ for spin $3/2 \tau^{\pm}$ the different helicity states of $\tau^{\pm}$ will possess different weights. When the beam energy is much larger than the mass of τ, we argue that, in some renormalizable models, τ may even have only $\pm 1/2$ helicity states. Therefore, the two body decay energy spectra will show a significant difference from that of τ with spin 1/2. This provides us with a very sensitive method to distinguish the spin of τ.

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AUTHOR: ZHANG Qiren [1728 0796 0088]

ORG: Beijing University

TITLE: "Surface Energies of Atomic Nuclei and the Mass of the Scalar Meson"

TEXT OF ENGLISH ABSTRACT: Assuming that the nuclear binding is dominated by a real scalar meson field, the mass of this meson is calculated to be 472 MeV from the nuclear surface tension coefficient by the Thomas-Fermi method and Van der Waals approximation. The agreement between this value and the mass of a chief scalar meson in the OBEP theory of nuclear force indicates that a more serious investigation of the above assumption should be valuable.

AUTHOR: SU Zongdi [5685 1350 3321]
        SHI Xiangjun [2457 0686 6511]
        TANG Xuetian [0781 1331 3944]
        TIAN Ye [3944 6851]

ORG: All of the Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "The Width Fluctuation Correction in Statistical Theory of Nuclear Reactions"

TEXT OF ENGLISH ABSTRACT: In the width fluctuation correction calculation of compound nuclear reaction, we have made a unified treatment of the reaction processes of particle emission, gamma emission and fission processes, in which the residual nuclei can be in discrete states or in the continuum. The calculated results of inelastic cross sections and the cross sections for particle emission, gamma emission and fission processes are self-consistent.

AUTHOR: LU Hanlin [4151 3211 2651]
         WANG Dahai [3769 1129 3189]
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         CUI Yunfeng [1508 0061 1496]
         CHEN Paolin [7115 1405 2651]

ORG: All of the Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "Excitation Curves for Some Reactions of Al, Ti, V and I"

TEXT OF ENGLISH ABSTRACT: Excitation curves for the reaction $^{27}Al(n,\alpha)^{24}Na$, $^{46}Ti(n, p)^{46}Sc$, $^{48}Ti(n, p)^{48}Sc$, $^{51}V(n, \alpha)^{48}Sc$ and $^{127}I(n, 2n)^{126}I$ have been measured by the activation method in the 4.5-18.3 MeV energy region. The cross section for the reaction $^{27}Al(n,\alpha)^{24}Na$ was determined at 14.61 ± 0.20 MeV. The measurement of neutron flux was performed using the associated particle method. The cross sections for other reactions were determined relative to the measured $^{27}Al(n,\alpha)^{24}Na$ cross section. The resulting activities were measured employing a calibrated NaI(TI) scintillation counter. The values obtained were

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[Continuation of GAONENG WULI YU HEWULI No 1, Jan 79 pp 88-96]

117.5 ± 3.0 mb, 291.4 ± 14.0 mb, 63.7 ± 3.2 mb, 16.8 ± 0.9 mb and 1656 ± 68 mb respectively. A brief comparison with existing data was made.

The total cross sections of ^{46}Sc and ^{48}Sc production in natural Ti sample were calculated using the atomic number of ^{46}Ti and ^{48}Ti.

AUTHOR: HE Zuoxiu [0149 4373 1652]
          HUANG Tao [7806 3447]

ORG: HE of the Institute of Theoretical Physics, Chinese Academy of
Sciences; HUANG of the Institute of High Energy Physics, Chinese Academy of
Sciences

TITLE: "A New Application of the Field-Current Relations"

TEXT OF ENGLISH ABSTRACT: In this paper we have applied the field-current
relations in the weak form to a series of processes of the radial excited
states. After assuming some properties for the matrix element we may obtain
the proportional relations for the processes of the radial excited states.
These relations agree with experiments reasonably.

AUTHOR: ZENG Jinyan [2582 6210 6056]

ORG: Beijing University

TITLE: "The Moments of Inertia of Multi-Quasi-Particle Excitation Bands and
the Blocking Effect"

TEXT OF ENGLISH ABSTRACT: It is shown that there exist some simple relations
among the moments of inertia of multi-quasi-particle excitation bands, provided
the blocking effect is neglected. Systematical discrepancy exists between the
experimental results and the quasi-particle prediction.

AUTHOR: WU Jingyuan [0124 4842 0337]
        WU Dandi [0702 0030 6611]
        LI Xiaoyuan [2621 1420 3293]

ORG: WU Jingyuan and WU Dandi both of the Institute of High Energy Physics,
Chinese Academy of Sciences; LI of the Institute of Theoretical Physics,
Chinese Academy of Sciences

TITLE: "Heavy Lepton τ Produced in e^+e^- Annihilation by the Interference
between Electromagnetic and Weak Interactions and Parity Violation Effects"

TEXT OF ENGLISH ABSTRACT: We propose the precise measurement of energy spectra
of cascade π and ρ in processes $e^+e^- \to \tau^+\tau^- \to e^+ + \pi^-(\rho^-,\mu^-)$+neutrinos in order to
determine parity-violating effects due to the interference between the electro-
magnetic and weak neutral current interactions. These observations are feasible
especially at heavy narrow resonances. Empirically we conjecture that the next
quarkonium may be at 28-31 GeV.

AUTHOR: ZHU Chongyuan [2612 6850 6678]
        CHEN Shi [7115 2514]

ORG: Both of the Institute of Theoretical Physics, Chinese Academy of
Sciences

TITLE: "Production of Υ Particles"

TEXT OF ENGLISH ABSTRACT: In this note, we discuss the cross sections of the
production of Υ particles in p-p collisions as color excited states in the
Han-Nambu model. The results are consistent with present experiments.

AUTHOR: HE Ju [0149 3515]
          ZHANG Zhaoxi [1728 5128 6007]
          HE Zuoxiu [0149 4373 1652]

ORG: HE Ju and ZHANG both of the Institute of High Energy Physics, Chinese
Academy of Sciences; HE Zuoxiu of the Institute of Theoretical Physics, Chinese
Academy of Sciences

TITLE: "The Photoproduction of Relativistic Para-Positronium and Muonium"

TEXT OF ENGLISH ABSTRACT: In this paper, the photoproduction of the relativis-
tic para-positronium and muonium, similar to the Primakoff effect, is calculated
using the perturbation expansion of the quantized composite field theory and
relativistic B-S wave functions. A new term multiplied to the form factor is
obtained, which makes the amplitudes different from what one obtains from the
point-model calculation usually used in this kind of process. It suggests that
the same effect mentioned above may occur in the ordinary Primakoff effect also.

AUTHOR: WANG Zhengzhi [3769 2398 0037]

ORG: Shandong University

TITLE: "On Meson Ratios in Multiparticle Production at High Energy--A Statis-
tical Quark Model"

TEXT OF ENGLISH ABSTRACT: A statistical quark model is proposed which combines
the quark model with the statistical thermodynamical model. The relative mul-
tiplicity of different mesons produced in the small longitudinal momentum region
is calculated. The result is in agreement with the experimental data.

AUTHOR: DONG Fangxiao [2639 2455 2556]
        ZHOU Xianjian [0719 0752 1696]
        HUANG Tao [7806 3447]
        XUE Peiyou [5641 0012 0645]

ORG: All of the Institute of High Energy Physics, Chinese Academy of
Sciences

TITLE: "Some Conjectures on Leptonic and Stratonic Spectra"

TEXT OF ENGLISH ABSTRACT: In this note the spectra of leptons and stratons
are conjectured and some interesting results are obtained: If the number of
the generations of leptons is four, then the next lepton mass is about 4.2 GeV,
and if the number of the leptons is five, then the fourth lepton mass is about
5.6 GeV. For stratons, if the number of flavor is six, then the mass of the
meson with $(t \bar{t})$ as a bound state is about 15 GeV, and if the number of flavor
is eight, then it is about 23 GeV.

AUTHOR: LIU Hanzhao [0491 3352 2507]

ORG: Nankai University

TITLE: "Finestructures of Inclusive Spectra (II)--Calculated Preliminarily
Using Models, and to be Determined Using Existing Data"

TEXT OF ENGLISH ABSTRACT: Existing data of rapidity patterns of charged par-
ticles can be utilized to determine some important types of inclusive spectra
of nearby particles. Some of these types may be used to study such open or
controversial problems as the size of the cluster, the local conservation of
charges, the effect of Bose-Einstein statistics, etc. The statistics of these
patterns are in general sufficient for inclusive spectra of nearby particles,
including 2 to 3 parameters and variables, and insufficient for those including
4 to 5 variables. In the latter case we introduce two special methods for the
organization of data: one of them is to find various types of "averages" over
rapidity intervals of the nearby particles, and the other is to find inclusive
spectra of nearby particles in the neighborhood of the maximum point. By means
of these methods, some special features of inclusive spectra of nearby particles

including 4 to 5 parameters and variables may be significantly determined.

The fragmentation model, advanced by Yang and collaborators, the one-dimensional version of Chew-Pignotti model with and without diffraction, and the independent cluster emission model in the form proposed by Quigg and collaborators, are used to calculate crudely the finestructures of inclusive and semi-inclusive spectra as well as to test the sum rules and the generalized form of Feynman-Yang scaling.

AUTHOR: LI Bingan [2621 3521 1344]

ORG: Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "Ward Identities and Bethe-Salpeter Equations and the Electromagnetic Transition Elements of Mesons and Baryons"

TEXT OF ENGLISH ABSTRACT: By using Ward Identities, the relations between the kernels of the mesonic and baryonic Bethe-Salpeter equation and their transition matrix elements of the electric current are obtained. These relations are the constraints for the assumptions underlying the discussion of the equations and the transition matrix elements. These constraints guarantee the conservation of the electromagnetic current. When the contribution of the straton loop diagrams is neglected the kernels of the transition matrix elements of the electromagnetic current can be computed from the kernels of B-S equation by using the relations given by Ward Identities. Under the potential assumption for the kernels of the equation, expressions of the kernels of the transition matrix elements are obtained. The transition matrix elements of the electromagnetic current can be computed by using the kernels of the equation and the solved wave functions.

AUTHOR: GAO Chongshou [7559 1504 1108]

ORG: Beijing University

TITLE: "Bethe-Salpeter Equation for Straton and Antistraton with Different Masses and SU(4) Mass Relations for Mesons"

TEXT OF ENGLISH ABSTRACT: In this paper, the theory of mesonic Bethe-Salpeter equation with instantaneous interaction is generalized to the case where the mass of the straton is not equal to that of the antistraton. Assuming that the stratons are heavy and the interaction is dominantly a pseudoscalar potential and a static vector potential, we derive the SU(4) mass splitting for mesons. The difficulties encountered by the first order SU(4) mass relations after the discovery of charmed particles are analyzed. It is pointed out that these difficulties disappear in our mass relations. In particular, the mass formula obtained with the potential of harmonic oscillator may explain not only the masses of both ground states and radial excited states, but also the effective masses of stratons, while the latter is compatible with the mass values for explaining the magnetic moments of baryons. Finally, we discuss the newly discovered heavy particle Υ using our mass relations.

AUTHOR: ZHOU Linong [0719 4539 6593]
        XIE Jialin [6200 1367 7792]

ORG: Both of the Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "A Bi-periodic Accelerator Structure"

TEXT OF ENGLISH ABSTRACT: A bi-periodic accelerator structure with coupling cavity of arrow-shaped cross section is described in this paper. This structure has the advantages of loose dimensional tolerance, simplicity in fabrication, convenience to feed RF power and good heat conductivity. Certain features of this structure are discussed and some useful data pertaining to concrete accelerator design are also included.

AUTHOR: YU Hong [6735 1347]
           LI Bingan [2621 3521 1344]

ORG: Both of the Institute of High Energy Physics, Chinese Academy of
Sciences

TITLE: "Hadronic Production of J/ψ, ψ' (3684) and the Content of the Charmed
Stratons in the Sea of the Stratons"

TEXT OF ENGLISH ABSTRACT: Hadronic production of J/ψ, ψ' (3684) particles is
discussed in this paper on the basis of reference [1] after considering the
massive effects of the charmed straton. The results of this reference are
improved.

With the aid of the decay of $\psi'' \rightarrow D\bar{D}$ and the effective coupling constant between
ψ'' (3772) and the charmed straton we estimate that the content of the charmed
straton in the sea of the stratons is 0.41 percent of the ordinary stratons at
most.

AUTHOR: ZHAO Weiqin [6392 4850 0530]
           BAO Chengguang [7637 6134 0342]

ORG: Both of the Institute of High Energy Physics, Chinese Academy of
Sciences

TITLE: "A Discussion of the Strength and the Range of the Phenomenological
Nuclear Force Using Experimental Data in High Energy Scattering"

TEXT OF ENGLISH ABSTRACT: Under the framework of the Bakamjian-Thomas theory,
we discuss the qualitative properties of the phenomenological nuclear force
$V = V_R - iV_I$ at high energy which are discussed by a comparison with the small
angle scattering data. Because these data in high energy are insensitive to
the spin, we suppose that the nuclear force at high energies is spin-indepen-
dent. The following are obtained:
i) for the Gaussian potential, $\chi_3 \simeq 200$ MeV and $\beta_3 \simeq 0.95$ fm, which are the
strength and the range of V_I respectively;
ii) in V_R there is no hard repulsive core. Under a rough estimation, supposing

the range $\beta_1 > 0.45$ fm, we find the strength of the repulsive force $\chi_1 < 480$ MeV; iii) all parameters vary very slowly with energy.

AUTHOR: HUANG Tao [7806 3447]
XUE Peiyou [5641 0012 0645]

ORG: Both of the Institute of High Energy Physics, Chinese Academy of Sciences

TITLE: "The Infrared Structure and the Electromagnetic Form Factors of Quantum Chromodynamics in Two Dimensions"

TEXT OF ENGLISH ABSTRACT: We discuss a model of quantum chromodynamics in 1+1 dimension. Using 't Hooft's 1/N expansion and considering the effects of the infrared structure in non-Abelian gauge theories by assuming that the coupling $g^2(t) \sim 1/t^{K-1}$, the Straton's Propagator and the Bethe-Salpeter equation of mesons are obtained; the properties of the meson wave functions and their characteristics are also discussed. From the behavior of the electromagnetic form factors and the deep inelastic scattering structure functions obtained, it follows that $K \leq 2$.

AUTHOR: MA Weixing [7456 4850 5281]
          LI Yangguo [2621 2254 0948]

ORG: Both of the Institute of High Energy Physics, Chinese Academy of
Sciences

TITLE: "Elastic and Inelastic π-Nuclear Scattering"

TEXT OF ENGLISH ABSTRACT: Using Glauber's theory, the π-^{12}C elastic and in-
elastic scattering differential cross sections at the energies 260 and 280 MeV
are calculated and analyzed. Compared with the experimental data, better fits
are obtained.

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          MAO Suyin [3029 4790 6892]
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          HAN Zhonglai [7281 0022 0171]
          GU Yidong [7357 6654 2639]
          DONG Yuju [5516 3768 3818]
          DAI Yifang [0108 5030 2455]

ORG: ZHAO, MAO, MA and HAN all of the Shenyang Institute of Automation,
Chinese Academy of Sciences; GU, DONG and DAI all of the Institute of High
Energy Physics, Chinese Academy of Sciences

TITLE: "The Momentum Selector of Big Cloud Chamber Set"

TEXT OF ENGLISH ABSTRACT: Using a "preselection-register-operation for re-
selection" program, a selection system of the Yunnan big cloud chamber set used
for cosmic ray research is projected and constructed. A small on-line digital
computation technique is applied to the momentum selector of the system, and a

special computation element is designed. According to the deflection angle and momentum of a charged particle passing through the magnetic field, computation and logical judgment can be done immediately for the track signal registered before.

AUTHOR: CHEN Jinquan [7115 6855 0356]
          YU Zurong [0060 4371 2837]
          WANG Fan [3769 0416]

ORG: All of the Department of Physics, Nanjing University

TITLE: "A Recursive Formula for the Celbsch-Gordan Coefficients of SU_n Group"

TEXT OF ENGLISH ABSTRACT: It is proved that under the Gelfand-Biedenharn phase convention any SU_n singlet factor (SF) belongs to the type of the derivable or underivable, designated as $(SU_nSF)d$ and (SU_rSF) respectively, and $(SU_nSF)d = (SU_rSF)$, $n = r+1, r+2, \ldots$. Therefore, the calculation of any SU_n Clebsch-Gordan coefficients is reduced to the calculation of a few underivable singlet factors (SU_rSF).

AUTHOR: CHEN Baoqiu [7115 1405 4428]
          LI Zhuxia [2621 4376 7209]
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ORG: All of the Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "On the Relative Wave Function of α- and d-Clusters in ^6Li"

TEXT OF ENGLISH ABSTRACT: In this paper, we have analyzed the experimental results of the quasifree sca ring ^6Li (p, pd)α with E_p = 156 MeV. Both PWIA and DWIA are performed   sing DWIA and the relative wave function proposed by Sakamoto et al.,   esults of our calculation agree better with the experiment.

AUTHOR: XU Gongou [1776 6501 5096]
          ZHANG Jingye [1728 2417 2814]

ORG: XU of Lanzhou University; ZHANG of the Institute of Modern Physics, Chinese Academy of Sciences

TITLE: "The Interplay of Nuclear Deformation and Pair Correlation Nuclear Phase Diagram"

TEXT OF ENGLISH ABSTRACT: Bringing the gauge space into consideration, the sudden transition of nuclear shape can be analyzed in association with that of pair correlation. Thus, not only the dramatic retardation of the E2 transition rate at the backbending can be reasonably used as a criterion for establishing the shape transition, but also the interplay of nuclear deformation and pair correlation can be clearly shown.

AUTHOR: WU Shishu [0702 1709 2873]

ORG: Department of Physics, Jilin University

TITLE: "On Nuclear Single-Particle Potentials (IV) Many-Body Forces"

TEXT OF ENGLISH ABSTRACT: It is shown that even if the nucleon-nucleon inter-actions contain many-body forces, the discrete energy eigenvalues ε_γ determined by the non-hermitian sp potential
$$u_{\alpha\rho} = M_{\alpha\rho}(\varepsilon_\rho)$$
still possess the following properties:
$G_{\gamma\alpha}(\varepsilon_\gamma) = \infty$, for at least one α. Since the points at which $G_{\gamma\alpha}(\omega)$ tends to ∞ are either its poles or the heads of its branch cuts (where $G_{\gamma\alpha}(\omega)$ is log-divergent), it follows that ε_γ is real and satisfies the relation
$$\varepsilon_\gamma = \pm[E_{n\gamma}(N\pm1) - E_0(N)].$$

AUTHOR: WU Zhongli [0702 6988 4539]
         ZHU Yongtai [6175 3057 3141]
         XIA Guozhong [1115 0948 0022]
         LIU Busheng [0491 5943 3932]
         LI Fawei [2621 4099 3262]
         FAN Guoying [5400 0948 5391]

ORG: All of the Institute of Modern Physics, Chinese Academy of Sciences

TITLE: "Study of the Deep Inelastic Scattering of ^{12}C on ^{27}Al"

TEXT OF ENGLISH ABSTRACT: The deep inelastic scattering of 71.5 ^{12}C ions on a ^{27}Al target was measured. ΔE-E telescope was used to identify the reaction products. The contour plots in the E-θ plane for the measured cross sections in the C.M.S. for B and Be show the general features of quasi-electric scat-tering at grazing angles and the deep inelastic scattering ridge extending from smaller angles and flattening at larger ones. Two special features may be worthwhile to mention. First, there are some fine structures near the Q.E. peak. Secondly, the average C.M. kinetic energy of the completely damped part is not equal to the Coulomb energy of the final state.

AUTHOR: LIU Bo [0491 3134]
         JIANG Huanqing [1203 3562 3237]
         LI Yangguo [2621 2254 0948]

ORG.:   All of the Institute of High Energy Physics, Chinese Academy of
Sciences

TITLE: "A Two-Nucleon Model of the (p, π^-) Reaction"

TEXT OF ENGLISH ABSTRACT: In this paper, we suggest a two-nucleon model of the
$A(p, \pi^-)$ B reaction. A reduced formulation of the reaction amplitude and a
relation between the reaction amplitude and the nuclear structure are given.
The differential cross section of $^{13}C(p, \pi^-)^{14}O_{g.s.}$ at E_p = 185 MeV is calcu-
lated in the plane wave approximation. The results + s can explain the ex-
perimental data qualitatively.

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AUTHOR: CEN Changyi [1478 7022 6939]
          MENG Zhaoyin [1322 3564 1377]

ORG: None

TITLE: "Calculation of Pressure Distribution for Flat-Head Body of Revolution"

TEXT OF ENGLISH ABSTRACT: The incompressible axial symmetry flow about flat-
head bodies of revolution is simulated by a series of co-axial vortex-ring.
The Fredholm's integral equation of the first kind, to satisfy the condition
of the velocity distribution around such bodies, has been established. A
numerical emthod to solve that equation and some numerical examples are given.
The results obtained are discussed and compared with experimental data and the
results obtained from the other theory.

AUTHOR: WANG Zhen [3076 4258/4176]
          LI Yongqi [2621 3057 0366]
          ZHANG Zhaoyi [1728 0340 1355]

ORG: None

TITLE: "Longitudinal Motion and Control System for '101' Hydrofoil Experi-
mental Craft"

TEXT OF ENGLISH ABSTRACT: In this paper, the longitudinal motion and control
system for "101" hydrofoil experimental craft based on the longitudinal motion
equations are discussed. Since the craft always experiences random sea dis-
turbances, a spectrum analysis technique was used and hydrofoil control system
was designed on a digital computer. Physical analogue experiments were also
conducted on the rotating table to further examine the control system. Finally
trials at sea were carried out for comparison between the conditions with and
without control system in operation.

The results of trials indicated that the effect of the control system was obvi-
ous; the craft could operate successfully in hydrofoil flying conditions at high

speed in the design sea state 3. The pitch angle θ_{3z} was less than 1.2^0; the heave acceleration $\ddot{h}_{3z}$ was less than 0.4 g; and foil broaching and hull slamming were not observed. The control system of the craft meets the prescribed requirements very well.

AUTHOR: CHEN Jiajing [7115 0502 5464]
          ZHANG Nianfang [1728 1628 2455]
          YUAN Yizhi [5913 3015 0037]

ORG: None

TITLE: "The Behavior and Calculation of a Suspended Cable in a Uniform Stream"

TEXT OF ENGLISH ABSTRACT: With the recurrence method, a program for the solution of the basic equations of a flexible cable immersed in a uniform stream is given and examples about underwater towing and deep-sea mooring cables are calculated. In addition, a normalization analysis, by means of which all shapes of such cables can be reduced to a curve depending only on one parameter, is treated. The curve thus obtained is similar in geometry to the true shape of the cable, and their similitude ratio depends on the tension in the cable.

With the aid of "The Normalization Graph of Cables" provided in this paper, the authors have discussed some practical problems, such as lessening the drift radius at mooring and increasing the depth of submersion of a towing body, and

proposed a manual method with which under various boundary conditions the geometrical shape and tension of a flexible cable can be easily calculated.

It is found that the calculated results fit the sea trial data well.

AUTHOR: CHEN Bozhen [7115 0130 4176]
          GONG Jingen [7895 6855 2704]

ORG: None

TITLE: "Lateral Buckling of Bulkhead Stiffeners"

TEXT OF ENGLISH ABSTRACT: Based upon the general buckling theory of bars with thin-walled open sections, the lateral buckling equation of bulkhead stiffeners is derived in this paper. Using Galerkin's method, a solution of the lateral buckling problem of bulkhead stiffeners simply supported under the triangular distributed load is obtained. Formulas and diagrams have been provided for calculating the critical load. An approach also has been presented to determine the critical load when the material of the bulkhead stiffeners is beyond the elastic limit.

AUTHOR: GAO Yuchen [7559 3768 5256]
         HUANG Kezhi [7806 0344 2535]

ORG: None

TITLE: "Stability of Thin Cylindrical Shells Reinforced by Rings and Subjected
to Hydrostatic Pressure"*

TEXT OF ENGLISH ABSTRACT: In order to analyze the stability of thin cylindrical
shells reinforced by rings and subjected to hydrostatic pressure, an asymptotic
method is presented in this paper. As the buckling displacement, the corre-
sponding stress, the critical load and each parameter of stiffness of the ribs
are expressed in power series of $\lambda^{1/4} \left(\lambda = \frac{h}{2\sqrt{3}\,R} \right)$, a method of solution is obtained.

Because an asymptotic method has been used, such a complex problem can be re-
duced into a simple vibration problem of a beam with several elastic supports.
When the stiffness of the ribs is equal and the number of the ribs is not very
few, an arithmetical formula to calculate the critical load can be obtained.

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The theoretical results have been checked closely by experiments on a set of
carefully machined cylindrical shells with ribs.

*Also taking part were: MA Yuke [7456 3768 2688], SUN Xuewei [1327 1331 0251],
SUN Qing [1327 0615], MA Bang'an [7456 6721 1344] and ZHANG Rongfang [1728 2837
5364].

AUTHOR: GU Jiajun [7357 1367 7486]
         YANG Weihuai [2799 0251 2037]

ORG: None

TITLE: "On the Method of the Technical and Economic Demonstration for
Merchant Ships"

TEXT OF ENGLISH ABSTRACT: In this paper, the process and method of the tech-
nical and economic demonstration for merchant ships are described, including:
--Investigation of firsthand information.
--Working out the demonstrative alternatives.
--Technical, operative and economic calculations of the demonstrative
alternatives.
--Evaluation of indexes for ship forms and selection of the optimum alterna-
tives.
--Drawing up the design specification.

Emphasis is laid on the method of the operative and economic calculations,
evaluation of indexes for ship forms and selection of the optimum alternatives.

AUTHOR: SHEN Xinyi [3088 0207 0001]

ORG: None

TITLE: "Application of the Dynamic Rigidity Method for Calculating Critical
Speeds of the Multi-Disk Rotor Systems on the Flexible Supports"

TEXT OF ENGLISH ABSTRACT: The dynamic rigidity method applied to the multi-disk
rotating systems is presented in this paper. The formula of dynamic rigidity to
the boundary conditions with flexible support is derived. It is correct to use
the proposed formula which has been verified by the derivative frequency equa-
tion of the one disk rotating system on the flexible supports. At the end, a
calculating example of a rotating system with two disks is given. Thus, the
range of application of the dynamic rigidity method can be expanded.

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